Claims

What is claimed is

1. One or more coils wound round a ferromagnetic material that forms a magnetic circuit. The entire structure developed on a semiconductor substrate using standard fabrication methods.
2. An integrated source of direct current for the coil of claim 1.
3. Air gap in the magnetic circuit of claim 1.
4. A plunger fabricated using the process of claim 1 that can move in and out of the air gap of claim 3 on a frictionless surface.
5. A mechanical mechanism to stop the motion of the plunger of claim 4.
6. A micro-mirror pivoted on a hinge about an axis fabricated through micromachining on silicon and joined to the plunger of claim 4.
7. Another plunger linked to the micro-mirror of claim 6.
8. Tilting of the micro-mirror of claim 6 by attraction of the plunger in the air gap of the magnetic circuit of claim 1 when current flows through the coil to create a change in the path of optical signal.
9. Use of the micro-mirror of claim 6 along a two dimensional array for an NXN, MXN or NXM optical cross connect.
10. A mass attached to the micro-mirror of claim 6 so that the mirror is in one stable position by the gravitational attraction of the mass.
11. Tilt of the micro-mirror with the mass attached of claim 10 with the excitation of the coil of claim 1 and switching action.
12. A two dimensional representation of the structure of claim 11 for an NXN, MXN or NXM optical cross connect.
13. Use of a permanent magnetic material in the magnetic circuit of claim 1 to augment the flux density in the air gap of claim 3.
14. A micro-mirror with a flat base and convex edges free to slide on a two dimensional surface.
15. N or M plungers linked to the micro-mirrors at a fixed angle to each other.
16. A sliding mechanism for the micro-mirror of claim 14 on the magnetic circuit of claim 1.

17. NXN, MXN or NXM magnetic circuits of claim 1 and displacement of mirrors about the air gap of magnetic circuits and switching of the optical signals through spatial displacement.
18. An optical element (a lens, a micro-mirror, a prism) mounted on a slab of liquid crystal on a semiconductor substrate using standard fabrication techniques.
19. Electrodes as sources of electric field to deform the liquid crystal integrated with the slab of liquid crystal and the optical element of claim 18.
20. Orientation change in the optical element of claim 18 arising out of this deformation and switching of the optical signal between a plurality of input and a plurality of output fibres.
21. A lever connecting the optical element of claim 18 to the liquid crystal to amplify the motion of the optical element with crystal deformation.
22. The lever hinged to a point close to the liquid crystal.
23. A two dimensional representation of the arrangement of claim 18 for optical switching.
24. A thin slab of an electro-optic material like lithium niobate whose refractive index changes under an external electric field.
25. Polishing of one end of the slab of claim 24 and leaving the other end of the slab transparent so that refraction and reflection are possible.
26. An electrode as a source of electric field which changes the refractive index of the material and creates a change in the angle of refraction of the incident radiation. This ray when reflected from the other end is displaced in space from the reflected ray for a different refractive index.
27. Faceting the edges of the slab of claim 21 to manipulate the directional orientation of the reflected ray.
28. Polishing the faceted edges of the slab of claim 21 to create changes in the incident radiation within or beyond the slab.
29. Polishing other sides of the slab of claim 21 in discrete or continuous manner to manipulate the direction of light within or outside the slab.
30. Faceting the lower (reflective) end of the slab of claim 21 to manipulate the direction of reflected light within the slab.
31. Use of the device of claim 26 in a two dimensional array for switching of signals in an NXN, MXN or NXM system.
